

WHAT IS CLAIMED IS:

1 1. A method of generating a graphical bar code, comprising:
2 applying an invertible graphical operation between regions of a base image
3 and information-encoding graphical templates selected from a predefined template
4 set to produce a graphical bar code with regions from which graphical templates are
5 recoverable by applying an inverse graphical operation between graphical bar code
6 regions and corresponding base image regions.

1 2. The method of claim 1, wherein the invertible graphical operation
2 corresponds to an exclusive OR (XOR) operation.

1 3. The method of claim 2, further comprising applying XOR operations
2 between the graphical bar code regions and corresponding base image regions to
3 produce the graphical templates.

1 4. The method of claim 1, wherein each of the base image regions and the
2 graphical templates has the same number of pixels.

1 5. The method of claim 4, wherein each of the base image regions and the
2 graphical templates has a common pixel layout.

1 6. The method of claim 5, wherein the common pixel layout corresponds
2 to a rectangular pixel array.

1 7. The method of claim 1, wherein each graphical template comprises a
2 pattern of bright and dark pixels.

1 8. The method of claim 7, wherein the number of bright pixels is greater
2 than the number of dark pixels.

1 9. The method of claim 7, wherein each pixel location within the
2 predefined template set has an equal probability of being a dark pixel.

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1 10. The method of claim 1, wherein the graphical templates are ordered
2 adaptively in accordance with one or more predefined rules relating to disfavored
3 graphical template sequences.

1 11. A computer program residing on a computer-readable medium and
2 comprising computer-readable instructions for causing a computer to:
3 apply an invertible graphical operation between regions of a base image and
4 information-encoding graphical templates selected from a predefined template set to
5 produce a graphical bar code with regions from which graphical templates are
6 recoverable by applying an inverse graphical operation between graphical bar code
7 regions and corresponding base image regions.

1 12. A method of decoding a graphical bar code, comprising:
2 applying an invertible graphical operation between regions of a graphical bar
3 code and corresponding regions of a base image to produce a set of measurement
4 blocks; and
5 selecting from a predefined template set information-encoding graphical
6 templates corresponding to the set of measurement blocks with the highest estimated
7 probability.

1 13. The method of claim 12, wherein the invertible graphical operation
2 corresponds to an XOR operation.

1 14. The method of claim 12, further comprising computing pixel value
2 probabilities for each of the measurement blocks.

1 15. The method of claim 14, wherein pixel value probabilities are
2 computed for a given measurement block based upon a weighted average of gray
3 value measurements over the given measurement block.

1 ~~A.3~~ 16. The method of claim 15, wherein the weighted average of gray values
2 ~~is computed by fitting a mask to the dot locations over the given measurement block.~~

1 17. The method of claim 16, wherein the mask has a truncated Gaussian
2 profile.

1 18. The method of claim 15, further comprising estimating parameters of
2 probability distributions fit to a histogram of the weighted average of gray value
3 measurements.

1 19. The method of claim 18, wherein the probability distributions are
2 asymmetric Laplacian distributions.

1 20. A computer program residing on a computer-readable medium and
2 comprising computer-readable instructions for causing a computer to:

3 apply an invertible graphical operation between regions of a graphical bar
4 code and corresponding regions of a base image to produce a set of measurement
5 blocks; and

6 select from a predefined template set information-encoding graphical
7 templates corresponding to the set of measurement blocks with the highest estimated
8 probability.

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